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Interactive comment on "Time of Emergence of trends in ocean biogeochemistry" *by* K. M. Keller et al.

Anonymous Referee #2

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This paper attempts to quantify "time of emergence" (TOE) for select ocean biogeochemical variables. The TOE concept in general is a good one, and something in which a broad community would have keen interest. However, this study falls short, in that the criteria used to compute TOE is not clearly explained. Moreover, I suspect that better, more rigorous TOE criteria could be defined. The basic notion is whether observed trends could be driven by natural variability. There is no mention of auto-decorrelation timescales, which I would think relevant to the idea that trends arise due to low-frequency natural variability.

I think this study could be published if revised substantially.

Comments

p 18066 ln 8: acronym ESM not defined.

p 18066 ln 22: Sentence beginning, "Reasons are large..." Awkward. Rephrase.

p 18068 ln 4: "In ocean biogeochemistry, the [TOE] method..."

p 18069 ln 3: Gettelmann et al. reference is weird, talks about feedbacks; it is not a general CESM1 reference and says nothing about the ocean carbon cycle model.

p 18069 ln 14: why is S/N > 2 used as the threshold? Presumably there are statistical arguments to be developed that would yield confidence level estimates.

p 18069-18070: this definition of S/N does not make sense to me. As described, S has units of quantity/time, i.e. °C/yr, whereas N has units of °C. So S/N has dimensions of 1/time. Furthermore, the standard deviation of annual means doesn't really seem to be the relevant metric against with to evaluate trends. It might be a good metric to evaluate extreme values, and these might manifest as a product of trends. But the language here is very imprecise. Fig. 1 doesn't help allay the confusion. It seems like by "trend" the authors mean a trend times a time period, yielding a projection.

Interactive comment on Biogeosciences Discuss., 10, 18065, 2013.